International Conference on Transparent Optical Networks, 2015, vol.2015-August

Spectra, thresholds, and modal fields of a circular microcavity laser transforming into a square

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Abstract

© 2015 IEEE. We investigate the lasing spectra, threshold gain values, and modal fields for a two-dimensional microcavity laser with a square contour defined by the super-circle equation. The cavity modes are considered accurately using the linear electromagnetic formalism of the Lasing Eigenvalue Problem (LEP) with exact boundary and radiation conditions. We reduce the original problem to a nonlinear eigenvalue problem for the Muller boundary integral equation and build a numerical algorithm of its solution. Computations demonstrate that under the deformation of microcavity from the circle to a square there exist modes that preserve low thresholds.

http://dx.doi.org/10.1109/ICTON.2015.7193654

Keywords

Boundary integral equations, Collocation method, Laser resonators, Lasers